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ABSTRACT

This study investigates the nature and stability of verbal behaviors for different contextual purposes in classrooms with varying structures, from traditional to open, utilizing the RCS interaction analysis system modified to code for contextual purpose (cognitive, procedural, social, affective, and behavioral). Eighteen observations were made in each of six primary classrooms following a schedule that controls for situational factors, e.g., subject matter, period of day. Results indicate consistency within teachers in the relative frequency with which verbal behaviors are used, both globally (without regard to contextual purpose) and for specific contextual purposes. In contrast, a wide range of variability was found in the total number of adjusted tallies per category both globally and for specific contextual purposes from one observation period to the next. The nature of verbal interactions for different contextual purposes varied according to the subject matter during the observation period as well as according to the structure of the classroom. The method used in this study demonstrates the increased precision in delineating differences in verbal interaction for differing contextual purposes, different subject matter areas, and different types of classrooms. Nevertheless, because of the complexity of interactions in the classroom and because of the amount of irretrievable information lost in the coding process, the usefulness of this type of verbal interaction analysis system for investigating teacher effectiveness is called into question. (Authors/JD)

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CLASSROOM VERBAL BEHAVIOR: CONTEXTUAL PURPOSES AND SITUATIONAL FACTORS[1]

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Investigations of teacher effectiveness have often utilized verbal interaction analysis systems as a measure of classroom process. However, reviews of the literature can point to only a few studies which report significant relationships between teacher verbal behaviors and either student process or student outcome variables (Dunkin & Biddle, 1974; Rosenshine & Furst, 1973). Among the factors which have contributed to the lack of significant results is the use of research designs which fail to control for situational factors such as subject matter and time of day. This omission often results in measurement error and an apparent lack of stability of teacher verbal behaviors (McGaw, Wardrop & Bunda, 1972; Frick & Semmel, 1974).

A second factor which may have contributed to the paucity of significant relationships between verbal behavior and student outcome measures is the lack of an adequate specification of the varying contextual purposes of verbal interactions, e.g. cognitive, procedural, behavioral, social, affective. For example, "asking questions" about interpersonal problems would be unlikely to have the same effect as asking questions about cognitive skills. Indeed,

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Mahaffey, Brophy, and Evertson (1975) note confusing results due to the fact that their research did not differentiate between academic (cognitive) questions and "management" (behavioral) questions.

This study[3] was designed, therefore, to account for (1) the contextual purpose of verbal behavior and (2) situational factors of subject matter, period of day, and type of classroom structure. This paper explores (1) the stability of verbal behavior within and across periods of the day and for varying contextual purposes; and (2) the patterns of verbal behavior for varying contextual purposes, subject matter areas, and types of classroom structures--extending from the traditional to the open.

Contextual Purpose

Definition. As defined in this study, contextual purpose[4] refers to five specific foci of verbal behavior: (1) Cognitive interactions, which concern cognitive skills, concept learning, intellectual problem-solving, and academically-related knowledge; (2) Procedural interactions, which center on organizing the day or the lesson, routines, and transitions; (3) Behavioral interations, which concern those behaviors or events that the teacher is likely to consider "problem behavior" or "behavior problems"; (4) Social interactions, e.g. chatting about friends and family; and (5) Affective interactions, i.e. verbal behavior concerning emotions and feelings.

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3 The study reported in this paper is part of a multiple measure research project designed to explore the effectiveness of teacher behaviors in a variety of types of classrooms--ranging from the traditional to the "open"--funded by the Instructional Laboratories, School of Education, University of California, Berkeley.

4 Note that his use of contextual purpose is distinct from Dunkin and Biddle's (1974) use of "context variables", e.g. equipment, building, administration, community, pupil population, etc.

Although several interaction analysis systems allow for recording whether verbal interactions concern ideas or feelings, a common assumption made in interpreting most interaction analysis data is that verbalization centers on academic or cognitive content. Often overlooked is the amount of time the teacher spends giving procedural directions or telling students how they should behave and the effect that these verbalizations have on the student. To permit a more precise analysis of classroom verbal behavior, these five contextual purposes were incorporated into the interaction analysis system used in this study.

Classroom Structure, Contextual Purpose, and Teacher's Role. Neglecting the contextual purpose of verbal behavior may also have limited the range of classroom structures for which interactions analysis systems are applicable. Variations in classroom structure exist within a classroom during different lessons or activities as well as between classrooms. The role of the teacher and of the student may vary according to the classroom structure. These differing roles of the teacher and the student may be reflected in the patterns of verbal interaction in terms of both (1) the diversity of categories of verbal behavior used by the teacher or the student, e.g. presenting, questioning, directing, and (2) the various contextual purposes of the verbalization. For example, in most traditional classrooms, a major part of the teacher's role involves presenting information. A certain amount of direction-giving would also be expected. In classrooms with a less traditional structure--including open classrooms[5]--, the teacher's role might be that of structuring the classroom situation so that the students can seek the information they need. Within this structure, the teacher's role may include more listening and observing; while the presentation and exchange of information is a part

5 See Marshall, 1972.

of the student's role. In such classrooms, there is more of a reciprocity of roles in that both the teacher and the student give directions, praise, etc.

Furthermore, in most traditional classrooms, the contextual purpose of verbal interactions would be expected to center on cognitive and procedural matters; whereas in many nontraditional classrooms, language reflecting interpersonal relations and feelings has an important place in supplementing language for cognitive purposes (Bussis & Chittenden, 1970; Marshall, 1972; Spodek & Waldberg, 1975). Consequently, utilization of a verbal interaction analysis system modified to include coding for contextual purpose is more likely to provide a more accurate picture of verbal interactions in classrooms with a variety of classroom structures as well as a greater likelihood of achieving significant results in studies of teacher effectiveness.

Stability of Classroom Behaviors and Situational Factors

Although a recent study has found overall stability for many classroom variables (Brophy, et al., 1975), most reviews of the literature have reported a lack of evidence regarding the stability of classroom variables (Medley & Mitzel, 1963; Rosenshine, 1970). Two major factors seem to be involved in this apparent lack of stability: (1) the lack of attention paid to the potential effect of situational factors in designing research studies noted above, and (2) the meaning of the term "stability" and its implications both for classroom research and for classroom practice.

As used in this paper, the term "stability" refers to a consistency in the frequency of particular categories of verbal interaction. It should be noted, however, that the opposite end of the "stability" continuum does not imply instability or inconsistency, but rather variability or flexibility. From a pedagogical point of view, this variability or flexibility usually has a deliberate purpose. Changes in the frequency of particular categories

of verbalization may be a function of changes in the classroom structure for different subject matters or for different educational purposes. For example, certain categories of verbal behavior may occur during a "class meeting" or "sharing time" that would not generally occur during a math lesson. For certain teachers, changes in the frequency of occurrence of certain types of verbal interaction may coincide with changes in the period of the day. For example, if reading occurs during the second period of the morning each day, the teacher may use certain verbal strategies during this period which s/he does not use during the first period when there is Sharing or News time. The occurrence of certain behaviors may also change within the same period but according to the day of the week. For example, in certain classrooms, Spelling may be scheduled for the third period on Monday, Wednesday, and Friday; while Art is scheduled during the third period on Tuesday and Thursday. A different set of behaviors would be expected during these two activities. If period 3 on Mondays and Wednesdays is examined, verbal behavior may appear quite stable. Conversely, inspection of period 3 behaviors on Mondays and Thursdays may indicate a lack of stability--i.e. real variability--which reflects actual situational differences.

In nontraditional classrooms, the students may be engaged in a variety of different activities during a particular period or during the entire day. These activities may vary somewhat from day to day. Consequently, both the teacher and the students may be observed to exhibit varying types of verbal behaviors within the same period from day to day, depending on the particular activity occurring. These types of verbal behaviors would be expected to reflect the type of verbalization most appropriate to the needs of the individual students at that particular time.

In some cases, high stability may be an indication of a limited repertoire of teaching strategies or even of rigidity. Hence, in actual classroom practice,

high stability within periods and across periods and days is not necessarily characteristic of an effective classroom. A certain amount of variability is more likely to reflect behavior appropriate to meeting the changing needs of the students and the demands of the situation.

In contrast, stable variables are needed for research purposes. Therefore, in order to be able to account for the possible contribution of situational differences in considering the nature and stability of classroom verbal behavior, three types of situational factors are included in this study: (1) a range of types of classroom structure, (2) different periods of the day, and (3) various subject matter areas and activities. Variations in classroom structure were determined by the sampling procedure described below. Differences in the period of day and subject matter (activity) during the observation period were controlled by the prespecification of observation times so as to include three periods during the morning (one of which was the Reading period), and by recording the subject matter content of the verbal interaction.

Research Questions

The issues which this aspect of the study was designed to explore concern the stability of verbal behavior and the use of verbal behavior for different contextual purposes. More specifically, the following questions were investigated:

(1) Does the stability of verbal behavior vary according to (a) period of day, (b) contextual purpose, or (c) individual teacher?

(2) Does the use of verbal behavior vary for different contextual purposes?

(3) Do patterns of verbal interaction for specific contextual purposes vary with differences in classroom structure?

(4) Does the use of verbal behavior for different contextual purposes vary with the content of the lesson?

METHOD

Instrument Selection and Use

Because of the reciprocity of teacher and student roles in many non-traditional classrooms, interaction analysis systems with only two or three student response codes do not adequately reflect the range of verbal interactions in these classrooms. The Reciprocal Category System (RCS) (Ober, Bentley, & Miller, 1971) includes equivalent categories for teacher and student. Therefore, this instrument was selected for modification.

Since coding for variations in contextual purposes is not fully considered in the RCS, modifications were made to allow for the coding of: (1) the contextual purpose of the verbalization -- cognitive, procedural, behavioral, social, affective (feelings) --, (2) the subject matter content, e.g. reading, math; and (3) whether the teacher spoke to an individual or to a group. In addition, a separate category was added to the original RCS categories for the coding of "Student reads" or "Teacher reads" -- as distinct from the presentation of information. The latter modification was made because in the primary grades, reading is a distinctly different activity from the presentation of information. Table 1 presents the Revised RCS categories. The contextual purpose codes are defined in Table 2. Category and context code definitions and examples are further elaborated in the manual (Marshall & Green, in preparation).

Observers used the Revised RCS to code verbal behavior according to the verbal categories listed in Table 1 at 5-second intervals. In addition, the contextual purposes listed in Table 2 and the nature of the subject matter were coded at the beginning of the observation periods and at each shift in contextual purpose and/or subject matter. The coders also recorded whether the teacher was speaking to an individual pupil or to a group.

The observer focussed attention on the teacher and those students who were interacting directly with the teacher or who were in the immediate presence of the teacher. Students who were talking to each other in another part of the room could not be coded.

Interobserver agreement (reliability) for three trained observers before the data collection began ranged from .70 to .78 (Scott's coefficient, Ober et al., 1971) based on a 5-minute videotape segment and a 16-minute classroom observation. Midway through the sequence of classroom observations inter-observer agreement was rechecked (with a 16 minute videotape). At this time, it was found that agreement had decreased. Inspection of the coding forms revealed that the decrement in agreement was due to two pairs of categories which the observers had difficulty distinguishing: (1) the Teacher questioning categories of Requests Clarification (3) and Elicits (4); and (2) the Student response categories of Responds (15) and Presents (16). When the two Teacher questioning categories (3 and 4) were combined and the two Student response categories (15 and 16) were combined, recalculation of the mid-collection agreement resulted in correlation coefficient ranging from .70 to .72. Consequently, these two pairs of categories were collapsed for purposes of subsequent data analysis.

Subjects

Six primary classrooms (grades 1 - 3) from a middle-class suburban area were selected by district administrators as outstanding examples of different types of classroom structure. The classrooms ranged from open (defined as using "flexible learning centers and a more individualized and interdisciplinary approach") to traditional (defined as using "a high degree of structure as exemplified by two or three groups for reading, spelling, and math."). The teachers were then interviewed by the Principal Investigator to ascertain their

perception of their classroom structure and their willingness to participate in the study. The teachers were also interviewed by an independent interviewer. This outside person ranked the teachers on several dimensions related to the openness and traditionalness of their classroom structure (see Marshall, 1972).

The teachers, all of whom were female, had a minimum of five years teaching experience.

Design

Eighteen observations were made by three trained observers with the Revised RCS in each of the six classrooms. Each classroom was observed on the same two days of the week during three consecutive weeks. During each of the six mornings, three 16-minute observations were made with the Revised RCS at prespecified times.

RESULTS[6] AND DISCUSSION

For purposes of data analysis, several adjustments were made. First, as noted above, category 3 was combined with category 4 and category 15 was combined with category 16 due to problems in maintaining interobserver agreement. Secondly, the total number of tallies per observation period was adjusted to a

6 Although the analysis reported herein is based on category frequencies, the possibility of sequential types of analysis was considered. However, sequential analysis is based on the assumption that the sequence of the categories recorded reflects a continuous and logical sequence of verbal interaction in the classroom itself. This assumption is questionable on several grounds. First, most good teachers attend to several students at once or in rapid succession. Even in presenting a lecture to a group of students, a teacher may diverge for an instant to redirect a child in another group whose attention is wandering or to praise a child who is working well. Such directions or praise are unrelated to the ongoing sequence of information presentation. The teacher may also be interrupted for a variety of reasons unrelated to the ongoing sequence. To the extent that most forms of interaction analysis do not account for these disruptions, a sequential analysis is likely to lead to incomplete or misleading results.

constant to allow for comparison across observation periods and across teachers. This adjustment was necessitated by the fact that although the observers recorded the verbal categories occurring at intervals of approximately five seconds, where shifts in categories occurred within the five second interval, additional codes were recorded. The number and speed with which shifts occurred varied somewhat from one observation period to another. Hence, the total number of tallies within each verbal and context category for each observation was adjusted by multiplying it by a fraction composed of the total number of tallies in that particular observation period divided by 275.

The Teacher Verbal Categories and Student Verbal Categories have been analyzed separately.

The data was analyzed for purposes of investigating (1) the stability of verbal behavior, (2) variations in the use of verbal behavior for different contextual purposes and in the classrooms with a variety of structures, and (3) the use of verbal behavior fc ifferent contextual purposes in different content areas. The results are discussed according to these three purposes in the following three sections of the paper.

1. Stability of Verbal Behavior

The stability of verbal behavior was analyzed in terms of (1) period of day, (2) contextual purpose, and (3) teacher differences.

Two types of analysis were used to investigate the stability of verbal behavior: (1) the relative frequency and (2) the total magnitude of use of the verbal categories.

The relative frequency refers to the rank order with which the verbal categories are utilized. Stability in terms of relative frequency reflects a consistency in the rank order with which the categories are used. For example,

does teacher X always use Presenting Information (6) most frequently during an observation period, and Questioning (3/4) next most frequently -- regardless of the absolute amount of tallies?

The total magnitude of tallies for each category generally reflects the total amount of time that particular categories of verbal behavior are used, regardless of the rank order. Stability in terms of the total magnitude represents a general constancy in the total number of adjusted tallies per observation period -- without regard to the relative frequency of use. For example, are there usually about 120 out of the total 275 tallies for Presenting Information during each observation period -- regardless of whether there is more or less Direction-giving? In other words, does this teacher spend a little less than half of most observation periods presenting information, regardless of whether more or less time is spent giving directions? The two types of analysis of stability yield somewhat different results.

Stability in Terms of Relative Frequency

The stability in terms of relative frequency of use of the verbal categories both globally -- without regard to contextual purpose -- and for different contextual purposes, within and across periods, was analyzed by means of Friedman's analysis of variance by ranks (Siegel, 1956). Where the results were significant, Kendall's coefficient of concordance (W) (Siegel, 1956) was calculated as a measure of explained variance. Tukey's pairwise comparisons were also calculated for the teacher categories to determine whether there is a significant difference in the relative frequency with which verbal categories are used across periods.

Where the χr^2 was not significant, the raw data was inspected to identify the factors influencing the apparent lack of stability.

Stability of Global Verbal Categories. As shown in Table 3 (Teacher Categories) and Table 4 (Student Categories), the relative rank ordering of the global verbal categories -- without regard to contextual purpose -- remains stable within and across periods for each teacher ($p < .05$), indicating consistency in the relative frequency with which the Revised RCS verbal categories are used when contextual purpose is disregarded.

Stability of Verbal Categories for Various Contextual Purposes. Analyzing the verbal categories according to contextual purpose by Friedman's analysis of variance by ranks seems to suggest that the stability of the rank order of the verbal categories varies according to particular contexts. (See Tables 3 and 4)

Cognitive and Procedural Contexts. As indicated by the significant χr^2s for Cognitive and Procedural contexts, the rank ordering of the use of verbal categories for these contexts remains stable within and across periods for each classroom. Thus, it appears that each teacher is consistent in the relative frequency with which she uses verbal behavior for these purposes.

Other Contexts. For most teachers, the χr^2s for Social, Affective, and Behavioral purposes did not reach an acceptable level of statistical significance in most periods. However, because this statistical procedure will fail to show significance where there is a large number of zero tallies or ties, a statistically significant χr^2 cannot be considered the only indicator of the stability. Therefore, for those contexts where the χr^2 was nonsignificant, the raw data was inspected to ascertain the possible reasons for the statistically nonsignificant χr^2s and the resultant apparent lack of stability.

Several reasons for the lack of significant χr^2s within the Social, Behavioral, and Affective contexts emerge: (1) lack of occurrence of any verbal

behavior within these contexts during many of the 18 observation periods (zero tallies for the observation period); (2) use of a minimal number of different verbal categories when verbal behavior within these contexts does occur (zero tallies for many categories); (3) a low number of tallies within those categories which are utilized; and (4) actual variability in the use of verbal categories.

Table 5 summarizes for each teacher (1) the number of observation periods during which no verbal interaction within the Social, Affective, and Behavioral contexts occurred; and (2) the highest total frequency of any verbal category for the Social, Affective, and Behavioral purposes within any observation period. Table 6 displays the number of observation periods during which 1, 2, 3, 4 and more than four categories were used for these purposes. Table 7 lists the number of observation periods each category was (1) the only category used within a Social context, (2) the most frequently used category within a Social context -- i.e. highest rank order, and (3) used within a Social context in a lower rank order. Table 8 presents the same information for the Affective Context and Table 9 for the Behavioral context. Note that if a category was the only category used, it was also the most frequently used category. Hence, the first two columns (only category used and most frequently used category) taken together actually indicate a high rank order.

Social Context. Inspection of Table 5 shows that there was no verbal interaction within a Social context for the majority of the 18 observation periods for all teachers except teacher E. Teacher E was the one teacher who showed overall stability of relative frequency of verbal behavior, as indicated by the statistically significant χr^2 (Table 3). However, Kendall's Coefficient of Concordance (W = .12) reveals that a small proportion of the relationship is explained by the χr^2 statistic for teacher E.

Where verbal behavior within a Social context does occur, Table 7 shows that the number of categories used in each classroom was relatively small. During most of those observation periods where verbalization within a Social context did occur, three or fewer out of the ten teacher categories were used -- resulting in a large number of zeros. In only three classrooms were four categories used, and this happened on only one or two occasions.

In addition, in most cases where verbal behavior within a Social context did occur, the number of adjusted tallies per category per observation was also small. Table 5 shows the highest number of adjusted tallies per category per observation for each teacher within the Social context. With the exception of one observation for teacher F, the highest cell frequency for any single category was less than 13 out of a possible 275.

Furthermore, although differences between classrooms exist, there is a relatively high consistency within most classrooms in the most frequently used teacher categories, as indicated in Table 7. For teachers A and H, Questioning (3/4S)[7] and Presenting (6S) are used most frequently for Social purposes. Teacher C used Warming (1S) most frequently. For teacher E, Warming (1S) and Questioning (3/4S) are most frequently used. For Teacher F, Questioning (3/4S) and Responding (5S) are most frequent. Teacher K uses Presenting (6S) most frequently in a Social context.

There is a similar consistency with which the Student verbal categories within a Social context are used, both within as well as across classrooms. Gives Responses and Information (15/16) is most frequently used in all classrooms.

Thus, each teacher seems to be stable in her use of verbalization for Social purposes in terms of the relative frequency with which each of the categories

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7 The letters following the category code e.g. 6C refer to the contextual purpose: C = Cognitive, P = Procedural, S = Social, B = Behavioral, F = Affective.

are used for this contextual purpose -- despite the nonsignificant χr^2 for all teacher except teacher E.

Affective Context. A similar pattern of results is evident for verbal behavior within an Affective context. Table 5 shows that no Affective verbalization occurred during half or more of the observation periods for each teacher and that where language for Affective purposes did occur during an observation period, only one or two Teacher categories were usually used for this purpose. On only several occasions were three or four categories used. The low frequency of adjusted tallies per category within the Affective context is displayed in Table 6. Fewer than 15 adjusted tallies within any category occurred, with the exception of teacher K, who during one observation period had 48.6 adjusted tallies in one category within the Affective context. For four of the teachers, fewer than 6 adjusted tallies per cell occurred during any one observation period. Table 8 lists the categories within an Affective context which occurred with the greatest frequency. The infrequent occurrence of affective verbalization is evident, especially for teachers A and C and especially for the student categories. However, the consistency with which certain categories are used by most teachers within the Affective context can be noted. Warming,(1F), Questioning (3/4F),and Presenting (6F) are the most frequently used Teacher categories; and Gives Responses and Information (15/16F) is the Student category most often used within an Affective context.

Thus, for Affective purposes as well, there appears to be stability in the relative frequency with which verbal categories are used, despite the lack of a statistically significant χr^2.

Behavioral Context. In five of the six classrooms, there is a statistically significant χr^2 for the use of the verbal categories within a Behavioral context across all periods. (See Tables 3 and 4) For one of these five teachers (Teacher H), there is a statistically significant χr^2 for the Teacher categories for periods

2 and 3 as well. In all cases, however, Kendall's Coefficient of Concordance (W) is quite low, suggesting that even where the χr^2 is statistically significant, a relatively small proportion of the relationship is accounted for.

Table 5 indicates that verbal interaction for Behavioral purposes occurred during most observation periods for all teachers. That is, compared to the use of Social and Affective language, language within a Behavioral context occurred during more observation periods. Nevertheless, for three teachers (A, C, and F), four or fewer verbal categories were used for Behavioral purposes. And for all teachers except teacher K, the highest number of adjusted tallies per category per observation was less than 22, indicating a small range of variability in those cases where verbalization for Behavioral purposes does occur.

As shown in Table 9, some teachers appear to utilize certain verbal categories for behavioral purposes with greater consistency than others. In classroom C, for example, only three Teacher categories and two Student categories are used relatively frequently. Thus, the verbal categories used for Behavioral purposes appears to be quite consistent in classroom C.

In other classrooms, there seem to be consistency in the most frequently used categories, i.e. categories with the highest rank order. More specifically, the most frequently used categories within a Behavioral context for all teachers were Gives Directions (7B) and Cooling (9B). Also fairly common was Questioning (3/4B). However, there appears to be greater variability in the use of additional categories. In other words, the particular categories that are less often used seem to vary from one observation period to the next. A review of the raw data suggests that a greater variety of verbal categories was used for Behavioral purposes during Sharing and Discussion periods than during more academic activities. Unfortunately, however, neither our interaction analysis data nor our method of data collection provide more specific information regarding the factors associated with this variability.

Summary. In brief, then, as evidenced by Friedman's analysis of variance by ranks and by an inspection of the raw data, each teacher seems to show a general stability -- within and across periods -- in the relative frequency with which she uses the verbal categories both without regard to contextual purpose and within Cognitive, Procedural, Social, and Affective Purposes. There also seems to be general stability in the most frequently used verbal categories for Behavioral purposes, but some fluctuation is evident in the use of the less frequently occurring categories of language for Behavioral purposes.

Stability and Variability of Total Magnitude of Verbal Behavior

The total magnitude of each verbal and context category was determined by tabulating the total amount of adjusted tallies within each observation period and across all 18 observation periods for each teacher.

Although the relative frequency with which the verbal categories are used both globally and for particular contextual purposes appears to be generally stable, the total magnitude of occurrence of the verbal categories varies greatly between one observation period and the next. Inspection of the adjusted tallies for each verbal and context category for each period reveals a wide range of total adjusted tallies. For example, the number of adjusted tallies recorded for Teacher C for Gives Directions (7) ranged from .9 to 127.4. Even when context is considered, the range of Gives Procedural Directions (7P) varies from 0 to 77.9 for this teacher from one observation period to another. Or for Teacher K, the total number of adjusted tallies recorded for Gives Responses and Information (15/16) ranged from 17.8 during one observation period to 154.8 during another. The specification of context still includes a wide range: 0 to 146.0 for Giving Cognitive Resposes and Information (15/16C).

While some of these differences in the total amount of adjusted tallies in the verbal categories can be accounted for by referring to the activity during the

observation period[8], the wide fluctuation makes certain types of statistical analysis difficult. Analysis of variance procedures were attempted in order to examine differences between teachers in their use of the various verbal categories for different contextual purposes during different periods and activities. However, when this analysis was undertaken, the variance within teachers was very large relative to the variance between teachers across verbal categories. None of the results approached statistical significance. A larger sample size with a greater range of teachers or perhaps an even finer specification of categories would be needed for this type of analysis. The latter solution would be plagued by a proliferation of categories and by an even greater difficulty in training observers and maintaining interobserver agreement. Because of the wide range in the total number of tallies per category per observation period, a descriptive analysis of the differences between teachers in their use of verbal categories for different contextual purposes in various types of activities was made.

2. Variations in the Use of Verbal Behavior for Different Contextual Purposes According to Classroom Structure

In order to explore verbal behavior for different contextual purposes in classrooms with varying structures, classrooms in the sample were selected as representing a range of types of structure -- extending from the traditional to the open. In addition, the teachers were ranked on several dimensions relating to the criteria for an open classroom (Marshall, 1972) based on an interview by an independent interviewer. Teacher C was ranked as the most open teacher; Teacher A was ranked second on dimensions of openness. Teacher K was rated by the interviewer (as well as by a district administrator) as a "good traditional teacher." The other teachers varied depending on which aspect of the classroom was considered.

8 Some of the differences due to activity are elaborated in Section 3.

(These differences are elaborated in the Final Report, Marshall, 1976.)

The use of verbal behavior for different contextual purposes was analyzed in terms of (1) the relative frequency and (2) total magnitude. Differences according to type of classroom structure are elaborated below.

Table 10 lists the rank order (relative frequency) of the Teacher verbal categories across all periods for Global, Cognitive, and Procedural contexts. (Statistically significant differences between categories calculated by Tukey's pairwise comparisons for these contexts are also presented in Table 10.) The relative frequency of use of the categories within Social, Affective, and Behavioral contexts are presented in Tables 7 - 9.

The total magnitude of usage (total number of adjusted tallies) across all observation periods for each category both globally and within each context for each teacher is displayed in Tables 11 - 16.

Note that category 10 signifies silence. In one sense, silence occurs without respect to context. However, where silence occurs following a particular context, it may be related to the context of the preceding verbalization. The rank order correlations and pairwise comparisons shown in Table 10 were calculated including Silence (10). Silence was not included in the tabulations of the relative frequency of category use listed in Tables 7 - 9. To facilitate comparison of the total magnitude of verbalization in different contexts, Tables 11 - 16 indicate the total adjusted tallies across all observation periods both including Silence and excluding Silence.

Cognitive Context

Within the Cognitive context, Table 10 shows that four of the six teachers (E, F, H, and K) utilize the Presenting Cognitive Information (6C) with greatest relative frequency. For the other two teachers (C and A), Presenting Cognitive Information (6C) occurs second in relative frequency. Although there are no

statistically significant differences between the two highest categories within the Cognitive context, it is interesting to note that those teachers for whom Presenting Cognitive Information (6C) is not the most frequently occurring category recorded are most "open" teachers in the sample. This finding is consistent with expectations derived from an "open education" framework in that the teacher is not usually the main source of cognitive information.

Similar differences between teachers are noted when the total magnitude for each category within the Cognitive context are compared -- as can be seen in Table 12. By this method, too, the same four teachers utilize the greatest total amount of Presenting Cognitive Information (6C). For both Teachers A and C, Silence (10C) is the most frequently occurring category within the Cognitive context. Again, less presentation of cognitive information and greater amounts of silence are consistent with the teacher's role in the more open classrooms.

Procedural Context

Table 10 shows that within the Procedural context, five of the six teachers utilize Giving Procedural Directions (7P), rather than presenting information as the strategy with greatest relative frequency. If Silence (10P) is disregarded, the sixth (most open) teacher also utilizes Giving Procedural Directions (7P) with the greatest relative frequency within a Procedural context.

When the total magnitude rather than the relative frequency of use of categories for Procedural purposes is considered, several differences in results can be discerned. (See Table 13) Although Teacher E's total use of Silence (10P) is slightly greater than her use of Giving Procedural Directions (7P), Teacher C's total use of Silence (10P) is almost three times as great as her use of Giving Procedural Directions (7P). (See Figure 1.) Furthermore, the amount of Silence (10P) used by Teacher C within a Procedural context is more than twice that for any of the other teachers. The frequent occurrence of Silence within a

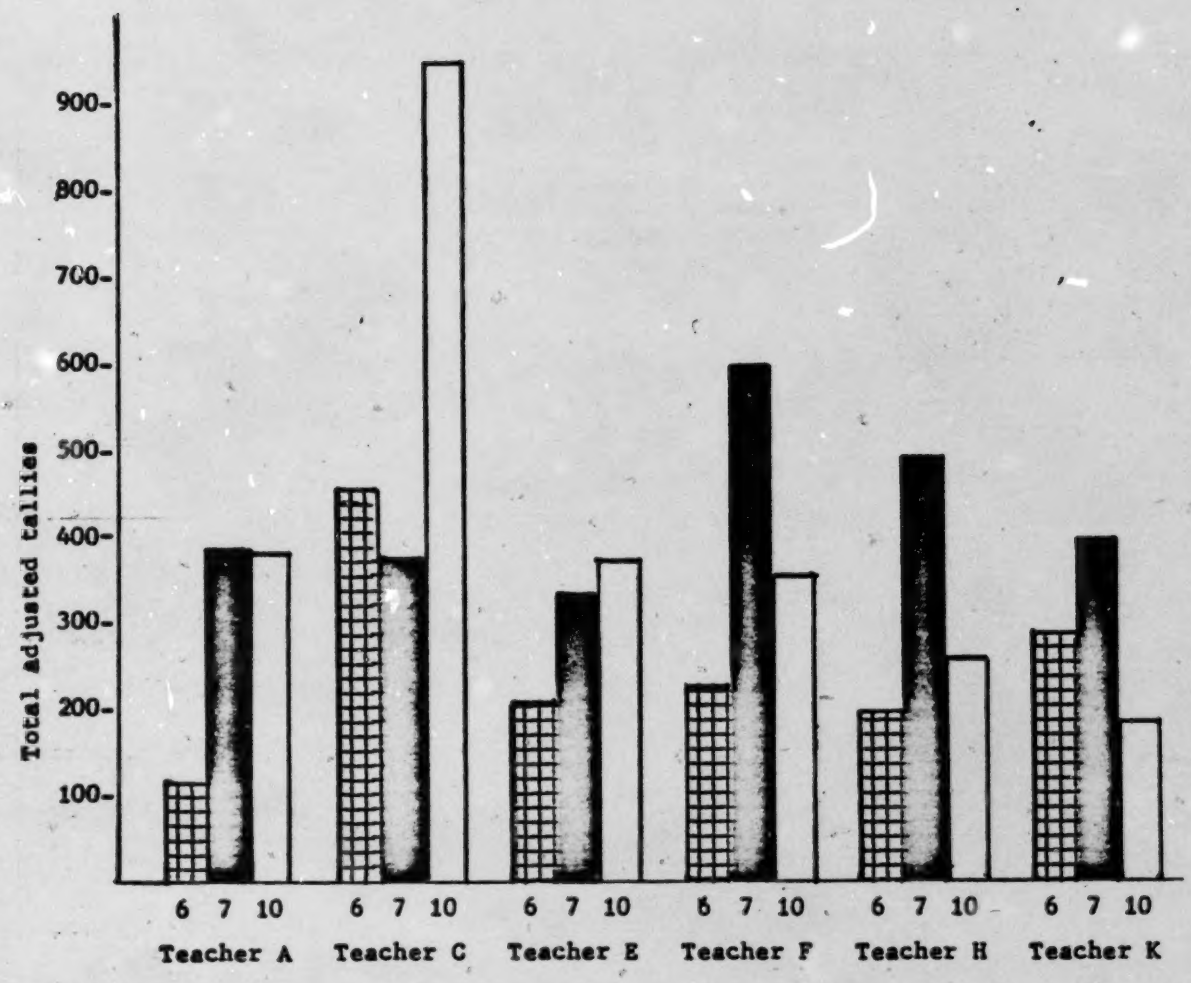

Figure 1. Total amount of Presenting Information (6), Giving Directions (7), and Silence (10) within a Procedural context.

Procedural context, especially for this teacher, is more important than might appear on the surface. Where procedural verbalization is followed by silence, it implies that time is being allowed for procedural directions or information to be followed without the students being bombarded with additional verbalization. Teacher C's high use of silence may be reflective of a style in which procedural directions are given, then there is silence while the teacher either watches to see if the student is carrying out the procedures or moves on to attend another student and is again silent before beginning a new interaction either within a Procedural context or by shifting to a different context.

While the data indicate a quantitative difference in the amount of silence between Teacher C and the other teachers, the inference regarding Teacher C's actions during silence goes beyond the data available and points to a limitation of interaction analysis systems: the lack of nonverbal information. Nonverbal information could be used to indicate the teacher's actions during silence, as well as those accompanying verbal behavior.

An additional difference reflective of a more open classroom structure is suggested by the degree to which teacher C uses Presenting Procedural Information (6P). Teacher C's total use of Presenting Procedural Information (6P) is greater than her total amount of Giving Procedural Directions (7P). (See Table 13 and Figure 1) Again, a higher amount of procedural information would be expected in open classrooms where the teacher does less presenting of cognitive information. In these classrooms, the students need to learn the procedures necessary to get cognitive information on their own.

Social Context

Within a Social Context, the teachers vary in their use of the verbal categories. In terms of relative frequency, Table 7 shows that Questioning for Social Purposes (3/4S) is used most frequently by Teachers E, F, and H; Presenting

Social Information (6S) is most frequently used by teacher K; Questioning (3/4S) and Presenting Social Information (6S) are tied for teacher A; and Teacher C uses Warming (1S) most frequently for Social purposes. If the amount of silence within the Social context is disregarded, a similar pattern is evidenced (in Table 14) by the total magnitude for each category -- with the exception of Teacher A who uses Responding (5S) for Social purposes with greatest total frequency. The differences according to total magnitude are displayed in Figure 2.

The frequent use of questioning for social purposes may reflect a common kind of social interchange. Teacher A's high use of responding in a social context may indicate that the students in this classroom are asking her social types of questions to which she responds. The high degree of presenting information for Social purposes by teacher K seems to be consistent with this traditional teacher's pattern of verbal behavior which includes presentation of information in a variety of contexts.

Affective Context

The pattern of the relative frequency of the verbal categories for Affective purposes is similar to that for Social purposes. As shown in Table 8, Questioning for Affective Purposes (3/4F) has the highest relative frequency for Teachers C, E, F, H, and is tied with Presenting Affective Information (6F) for Teacher K. One difference exists for Teacher A in that she uses Warming (1F) within an Affective context with greater relative frequency than she uses Questioning (3/4) -- which she used frequently for Social Purpose.

The total magnitude of adjusted tallies for each category within the Affective context is generally consistent with the information regarding relative frequency, especially if the total amount of Silence (10F) is disregarded for Teacher C. (Table 15) A notable difference, however, between the relative and total frequency is the total magnitude of Teacher K's use of Presenting Affective Information (6F).

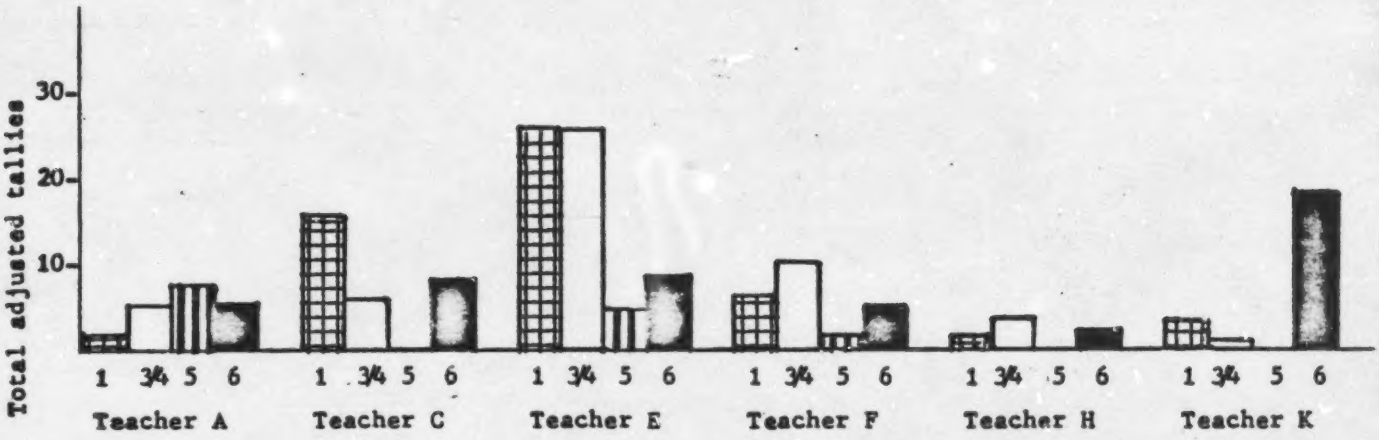

Figure 2. Total amount of Warming (1), Questioning (3/4), Responding (5), and Presenting Information (6) within a Social context.

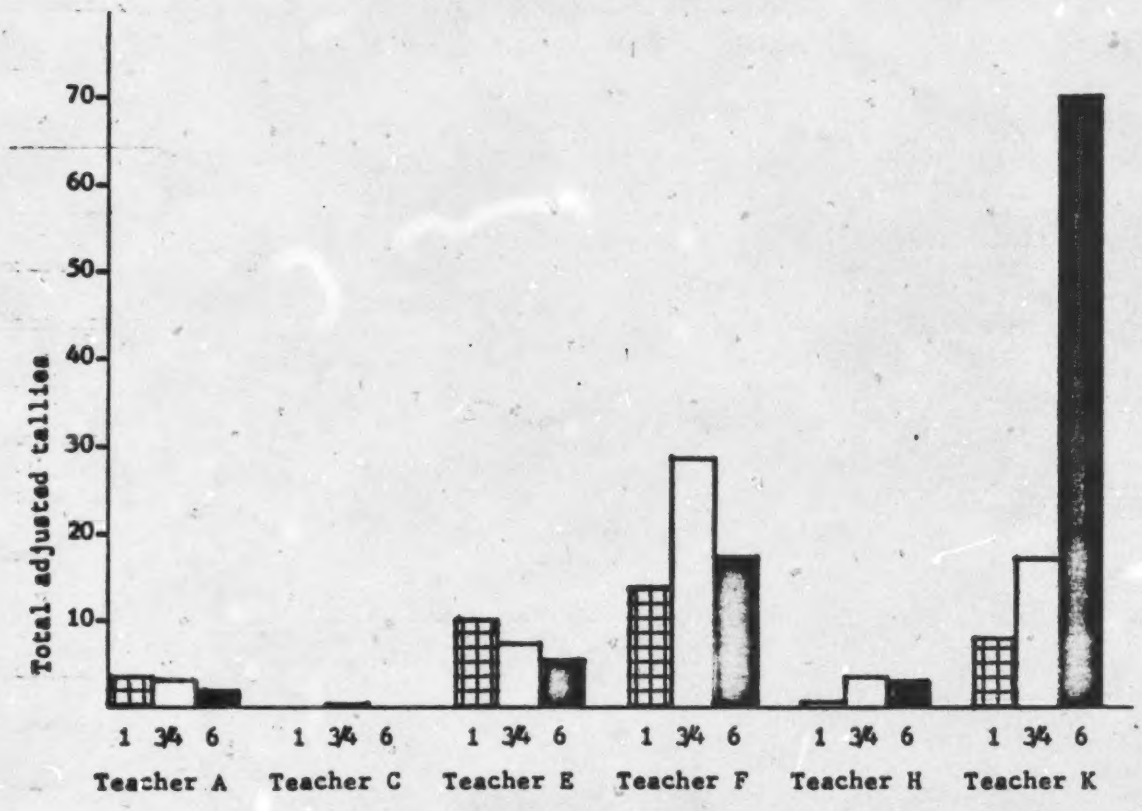

Figure 3. Total amount of Warming (1), Questioning (3/4), and Presenting (6) within an Affective Context.

For Teacher K, Presenting Affective Information (6F) is four times the amount of Questioning (3/4F). (See Figure 3.) The high amount of this category for Teacher K is consistent with the conception of good traditional teachers whose major strategies include presenting information verbally in a variety of contexts.

Behavioral Context

Within a Behavioral Context, the verbal category used with highest relative frequency by all teachers is Giving Behavioral Directions (7B); followed in most cases by Cooling (9B). (See Table 9.) The total magnitude of usage of the verbal categories for Behavioral purposes coincides with the relative frequency of use, as presented in Table 16.

Summary of Differences according to Classroom Structure

The analysis of verbal interaction according to contextual purpose thus reveals differences in the structure of the classroom. The greatest amount of silence occurs in the most open classroom. This may reflect a teaching strategy in which the teacher spends time silently observing before verbally interacting with students -- although this inference goes beyond the data collected by verbal interaction analysis systems.

For Cognitive purposes, Presenting Cognitive Information (6C) is the most frequently used category for all but the more open teachers. For Procedural purposes, Giving Procedural Directions (7P) is the most frequently used category for all teachers except the most open teacher, who gives Procedural Information (6P) most frequently. (See Figure 1.) The most open teacher's use of procedural information may reflect a structuring of the activities so that individual students can seek information.

For both Social and Affective purposes, the most frequently used categories were Questioning (3/4S and 3/4F) and Warming (1S and 1F) for all teachers except the teacher rated as a "good" traditional teacher. This traditional teacher uses Presenting information (6S and 6F) most frequently for Social and Affective purposes as well as for Cognitive purposes. (See Figures 2 and 3.)

Within a Behavioral context, Giving Behavioral Directions (7B) was used most frequently by all teachers, generally followed by Cooling (9B). It should be noted, however, that the select nature of the sample may have contributed to the lack of difference between teachers in the type of verbalization within a Behavioral context.

Differences in classroom structure and the increased precision allowed by specification of contextual purpose of verbal behavior are further highlighted by comparing the two teachers who were at opposite ends of the spectrum of open to traditional structure (Teachers C and K). Figure 4 illustrates some interesting comparisions between these teachers in the amount of Presenting Information (6).

Without regard to context, the total amount of Presenting Information (6) recorded for Teacher C across all 18 observation periods is about three-fourths the amount of that recorded for Teacher K. (See also Table 11.) Within a Cognitive context, Teacher C Presents Information (6C) about half the amount of time that Teacher K does. (See also Table 12.) Within a Procedural context, Teacher C appears to be spending one and a half times as much time Presenting Information (6P) as Teacher K. (Table 13.) That is, Teacher C appears to be spending more time structuring the lesson and giving Procedural information; whereas Teacher K seems to spend more time giving Cognitive information. These differences appear to represent differences in classroom structure, consistent with different philosophies of education, since in the more open classrooms, information is acquired from a variety of sources, e.g. materials, peers, etc. rather than mainly from the teacher. Perhaps more procedural information is needed for students to be able to seek the academic information they need. Or procedural information may be given more frequently because students who are working individually may each need to be given this information individually.

The importance of adequate specification of contextual purpose is emphasized by these differences.

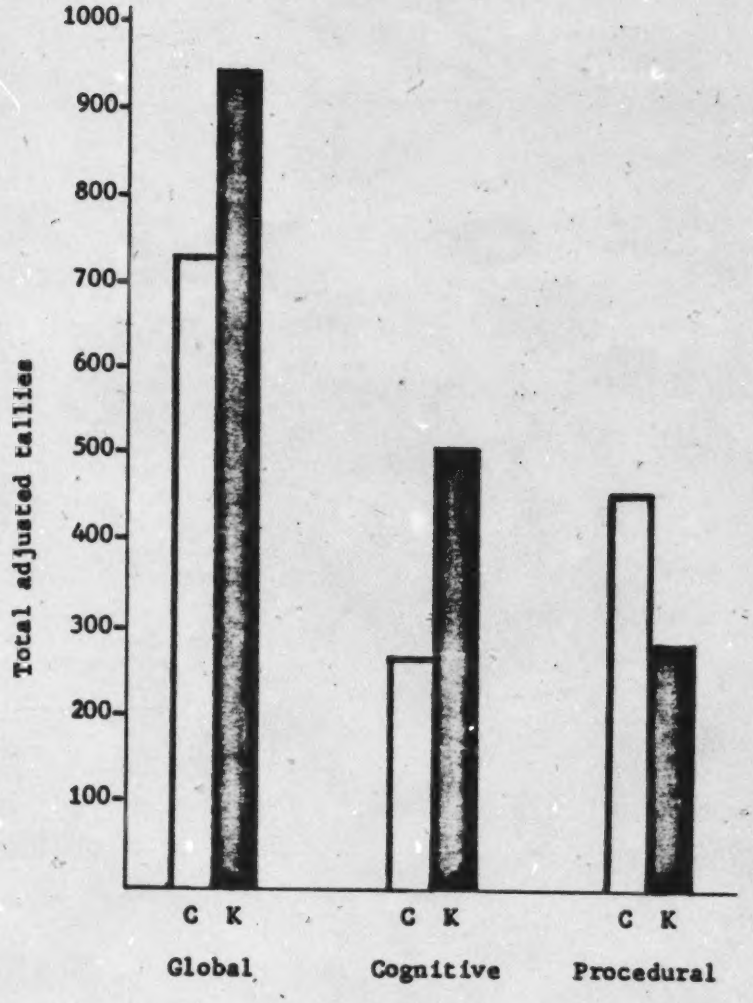

Figure 4. Total amount of Presenting Information for Teachers C and K.

3. Verbal Behavior for Specific Contextual Purposes and in Differing Activities

In order to be able to examine differences in verbal interaction according to the content of the lesson (activity), observations were scheduled during specific periods of the morning, including one Reading period each morning. In addition, the subject matter content of the verbalization was recorded. However, the analysis of verbal behavior for different subject matter areas was complicated by the fact that in most classrooms, a variety of activities occurred within each period. Only in those instances where a single activity occurred during an observation period have comparisons been made at this point.

Differences in Verbal Behavior according to Activity and Classroom Structure

Inspection of the amount of Students Responding and Giving Information (15/16) according to contextual purpose and activity provides an example of the importance of specifying contextual purpose and activity in delineating differences between classrooms and in avoiding misleading results in correlational studeies of teacher effectiveness.

Table 17 shows the mean number of adjusted tallies for Student Gives Response and Information (15/16) both (1) without regard to context and (2) within the cognitive context as well as (3) without regard to activity, and (4) within Reading period and Sharing period. Without regard to context, the students in classroom C, do far less verbal responding and giving information than do students in the other classrooms. Recall, however, that the structure of the observation was such that the observers focused on the teacher so that the student talk recorded was either directed towards the teacher or occurred in the immediate presence of the teacher. Students talking to each other without the teacher present were nct coded by the observers. Designating contextual purpose demonstrates even more striking difference in the amount of Giving Cognitive Responses and Information (15/16C)between the students in classroom C and those in the other classrooms -- particularly in

comparison to classroom K. On the surface, it is rather surprising that students in classroom K respond and present information in Cognitive contexts almost four times as much as those in classroom C (means = 56.5, 15.5). On a theoretical basis, greater amounts of this type of student talk would be expected to occur in an open rather than a traditional classroom. However, further examination of the precise situations in which students gave cognitive responses and information is enlightening. For classroom K -- as well as for classroom E -- students gave noticeably high amounts of Cognitive responses and information during Sharing Period (means 113.2, 142.7, respectively) -- a period specifically structured for student information-sharing. No observations during a Sharing period were made in classroom C or H. When the amount of Giving Cognitive Responses and Information (15/16C) is compared during Reading periods, the differences between teachers are not as marked. It appears that in certain classrooms, the total amounts of Giving Cognitive Responses and Information (15/16C) seem inflated when all periods -- including Sharing are taken together. A more accurate description of the differences between classrooms is portrayed when the activity as well as the contextual purpose are considered. Indeed, the effect of students giving responses and information during a Sharing period may be quite different than that during Reading period. Correlations calculculated between student learning outcome measures and category totals which do not account for the activity would thus be likely to result in either spurious or statistically nonsignificant relationships.

Other Differences in Contextual Purposes according to Teacher and Activity.

A number of Teacher differences that seem unrelated to the open-traditional continuum are suggested by looking at the Affective context. Inspecting the sum total of all the categories within the Affective context, particularly when the amount of Silence (10F) is subtracted, indicates that in classroom C, practically no verbal interaction within an Affective context occurred. (See Table 15) This

may be attributable, in part, to the personality of this particular teacher rather than to the openness of the classroom structure. The minimal amount of Affective verbal interaction in classroom C can be contrasted with the amount in classroom K -- a traditional classroom -- and classroom F -- whose teacher was just beginning to open her classroom and stated in an interview that she was "getting into feelings."

A closer look at the raw data shows that for Teacher K and Teacher F, the major portion of the Affective verbal interaction occurred during three observation periods. For Teacher K, half of the total amount of the Affective verbalization (68.2) was recorded during one discussion of a problem on the playground. Another large segment (19.3) occurred during another discussion period. The third large segment (23.7) occurred during one Reading period. For Teacher F, one segment of verbal interaction for Affective purposes (15.7) occurred during Sharing. The other two observation periods where more than a few tallies of Affective verbalization were recorded were during two Reading periods (48.7 and 10.5). Affective language during a discussion or during Sharing time is not uncommon in primary classrooms. However, interaction analysis does not provide sufficient information to explain the verbalization for Affective purposes during Reading. It is not clear whether these teachers are attempting to relate the Reading content to the pupils' feelings and experiences, whether the teachers are considering how the pupils feel about the process of reading instruction, or whether the teachers are dealing with pupils who have encountered some problem during the Reading period but unrelated to reading.

Whereas specifying the contextual purpose of verbal interaction and the subject matter allow for a more precise discrimination of teacher differences and perhaps an increased likelihood of achieving significant relationships with outcome measures, it may be that the nature of this type of verbal interaction

analysis system is such that the amount of relevant information lost in the category coding process renders the technique unproductive for purposes of teacher effectiveness research.

CONCLUSIONS

Based on the data collected in this study, an analysis of the frequency of categories of verbal behavior -- both in terms of the relative frequency and in terms of the total magnitude of use -- sheds light on the nature and stability of classroom verbal behavior and suggests several implications for future research.

First, this study demonstrates that recording the contextual purpose of the verbal interaction and the subject matter content allows for a more precise specification of the nature of verbal interactions in the classroom. Analyzing the use of categories of verbal behavior for specific contextual purposes yields a more accurate picture of verbal interaction than does a global analysis in which the context is not considered. Furthermore, this investigation indicates that verbal behavior for different contextual purposes varies according to both (1) the type of activity or subject matter content and (2) the type of classroom structure. Differences in patterns of verbal behavior in traditional and open classrooms are more apparent when the contextual purpose was analyzed and even more lucid when the subject matter of the lesson was included.

Because omitting contextual purpose and activity from an analysis of classroom verbal interactions is likely to result in spurious or nonsignificant correlations with outcome measures, it would seem important for future studies utilizing classroom verbal behavior to control for and adequately sample contextual purpose and activity.

Secondly, this study seems to point to differences in the stability and variability of classroom verbal interaction as a function of the method of data

analysis. In terms of the relative frequency with which the verbal categories are used, both globally and for specific contextual purposes, verbal behavior seems to be generally stable. That is, the rank order of verbal behavior for most contextual purposes is generally consistent across observation periods for each teacher. In contrast, a wide range of variability was indicated by the total magnitude of the various categories of verbal behavior -- both globally and for specific purposes -- from one observation period to the next. While some of the variation in the magnitude of use of the different verbal categories can be explained by referring to the activity occurring during particular observation periods, neither the use of interaction analysis -- even modified to include contextual purpose -- nor this method of data collection provide sufficient information to adequately account for this variability. To ascertain patterns of consistency of classroom verbal behavior other than in terms of the relative frequency, either further refinement of the interaction analysis system or supplementary coding categories may be needed.

It should be noted, however, that the current revisions in the Reciprocal Category System in order to code for contextual purpose made training of observers and maintaining interobserver agreement difficult -- even with sophisticated graduate students. Any further refinements in the interaction analysis system in order to decrease the variability would be likely to make interobserver agreement even more difficult to maintain.

A possible solution to this problem recommended by Dunkin and Biddle (1974) is the use of multifaceted categorical instruments for coding classroom events from recordings (in exploratory research). However, our experience indicates that coding from videotapes is also complicated by problems of loss of information regarding the nature of the activity in the rest of the classroom -- as these reviewers indeed point out.

Means of overcoming problems of the complexity of interactions in the classroom, the variability of verbal behavior from one observation period to the next, and the amount of irretrievable information lost in the coding process do not seem to be on the horizon. Consequently, the usefulness of this type of interaction analysis system in investigating teacher style and teacher effectiveness is called into question. A more productive strategy might be the use of observational techniques which reflect both verbal and nonverbal behaviors and global structuring strategies, such as sign-systems or low-inference rating scales (Marshall, Green, & Lawrence, 1976).

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Table 1

Categories for Revised Reciprocal Category System (RCS)

(derived from Richard L. Ober)

Category Number Assigned to Teacher	Description of Verbal Behavior	Category Number Assigned to Student
1	"WARMS" (INFORMALIZES) THE CLIMATE: Tends to open up and/or eliminate the tension of the situation; praises or encourages the action, behavior, comments ideas, and/or contributions of another; jokes that release tension not at the expense of others; accepts and clarifies the feeling tone of another in a friendly manner (feelings may be positive or negative; predicting or recalling the feelings of another are included).	11
2	ACCEPTS: Accepts the action, behavior, comments, ideas, and/or contributions of another; positive reinforcement of these.	12
3	REQUESTS CLARIFICATION: Asks for clarification or elaboration of actions, behavior comments, ideas and/or contributions of another.	13
4	ELICITS: Asks a question or requests information about the content, subject, or procedure being considered with the intent that another should answer (respond).	14
5	RESPONDS: Gives direct answer or response to questions or requests for information that are initiated by another; includes answers to one's own questions.	15
6	PRESENTS: Presents facts, information, and/or opinion concerning the content, subject, or procedures being considered that are self-initiated; expresses one's own ideas; lectures.	16
7	DIRECTS: Gives directions, instructions, orders, and/or assignments to which another is expected to comply.	17
8	CORRECTS: Tells another that his answer or behavior is inappropriate or incorrect.	18
9	"COOLS" (FORMALIZES) THE CLIMATE: Makes statements intended to modify the behavior of another from an inappropriate to an appropriate pattern; may tend to create a certain amount of tension (i.e., exercising authority in order to gain or maintain control of the situation, rejecting or criticizing the opinion or judgment of another.)	19
10	SILENCE: Pauses, periods of silence.	10
20	READING	21
Z	CONFUSION: Unrelated calling out.	Z

Table 2

Revised RCS Interaction Analysis System: Context Categories

The RCS Interaction analysis system has been divided according to the context and content of the verbalization into the following classifications:

CONTEXT CODE:	CATEGORY DEFINITIONS

C COGNITIVE INTERACTIONS:

Cognitive interactions include those verbalizations which involve:
(1) skill and concept learning, e.g. "Which words do we capitalize?"
(2) cognitive problem-solving, e.g. "What do you think will happen if we add water?"
(3) academically related topics and extension of knowledge base, e.g. "Do you remember seeing anything like this at the zoo?"
(4) performance of cognitive acts, e.g. "That's really good thinking!"

P PROCEDURAL INTERACTIONS:

Procedural interactions include those questions and comments extraneous to the cognitive aspects of the lesson. Procedures include:
(1) statements and questions which are used to set up and organize a lesson, e.g. "Turn to page 17." "What do we do next?"
(2) statements and questions regarding routines and transitions, like snack, toilet, lineup, clean-up, e.g. "Put away the blocks and line up now."
(3) polite formalisms, e.g. "Please." "Thank you."

B BEHAVIORAL INTERACTIONS:

Behavioral interactions refer to verbalizations regarding behavior sequence which are usually unacceptable or ant-social behavior, i.e. those behaviors which the teacher considers to be a "behavior problem". Behavioral interactions include:
(1) interpersonal problems such as fights, e.g. "How did the fight start?" "He keeps bugging me!"
(2) individual misbehavior, e.g. "John, quit banging on the desk!"
(3) redirection of behavior, e.g., statements which direct a child who is beginning to wander or about to misbehave back to the task or towards appropriate behavior, e.g. "Go back to your seat now John, and finish your math"--if John was wandering. These statements do not necessarily acknowledge the misbehavior.
(4) situations where negative behavior sequences have usually occured in the past, but for some reason do not at this time, e.g. Johnny usually hits when toys are taken but this time did not & teacher acknowledges.

S SOCIAL INTERACTIONS:

Social interactions are those verbalization which involve:
(1) chatting about friends, family, breakfast food, movies--unrelated to academic content.
(2) questions and statements regarding physical feeling, e.g. "I have a headache."

F FEELINGS:

Interactions concerning feelings are those statements, and questions related to emotions and affective dimensions such as liking, dislike, happiness, anger. Examples include "Why are you angry?" "Don't you like learning about insects?" Note that the term feelings is frequently misused to express an opinion, e.g. "I feel that it would be better if ..." These verbalizations do not express feelings in the affective sense of the word and are therefore coded as cognitive opinions rather than true feelings.

Table 3

Friedman's χ_r^2 and Kendall's Coefficient of Concordance (W)

for Revised RCS Teacher Categories According to Contextual Purpose

for each Teacher Within and Across Periods

		Teacher A		Teacher C		Teacher E		Teacher F		Teacher H		Teacher K	
Contextual Purpose	Period	χ_r^2	W	χ_r^2	W	χ_r^2	W	χ_r^2	W	χ_r^2	W	χ_r^2	W
Global (without context)	1	37.50*	.69	46.51*	.86	31.42*	.58	47.35*	.88	42.77*	.79	43.12*	.80
	2	44.00*	.81	45.64*	.85	45.26*	.84	42.47*	.79	42.83*	.79	42.75*	.79
	3	37.27*	.69	32.85*	.61	41.36*	.77	46.96*	.87	41.26*	.76	43.79*	.81
	All	133.82*	.70	119.59*	.74	98.68*	.61	132.46*	.82	117.09*	.72	124.23*	.77
Cognitive	1	35.19*	.65	35.28*	.63	33.57*	.62	42.44*	.79	37.58*	.70	46.27	.86
	2	33.86*	.63	32.91*	.61	41.43*	.77	40.99*	.76	39.57*	.73	44.33*	.82
	3	27.28*	.51	32.31*	.60	39.74*	.74	40.29*	.75	39.53*	.73	27.44*	.51
	All	91.7*	.57	96.69*	.60	97.96*	.60	119.04*	.73	111.81*	.73	112.43*	.69
Procedural	1	43.84*	.81	41.23*	.76	34.50*	.64	45.36*	.84	41.49*	.77	34.41*	.64
	2	41.55*	.77	43.58*	.81	40.72*	.75	38.81*	.72	35.34*	.65	40.58*	.75
	3	37.67*	.70	34.50*	.64	45.72*	.85	38.81*	.72	41.27*	.76	41.53*	.77
	4	117.41*	.72	114.28*	.71	111.42*	.69	118.91*	.73	110.05*	.68	111.64*	.69
Behavioral	1	2.86		14.89		8.57		8.65		8.12		15.02	
	2	3.62		10.78		12.90		7.95		17.56*	.33	8.12	
	3	7.91		11.93		11.20		14.80		18.77*	.35	13.23	
	All	7.47		35.86*	.22	25.42*	.16	27.10*	.17	40.47*	.25	32.71*	.20
Social	1	2.25		2.00		8.88		2.83		2.37		2.89	
	2	.73		3.18		9.19		2.11		.73		.40	
	3	2.96		6.99		5.46		.95		0		4.77	
	All	2.41		7.93		19.41*	.12	3.07		1.35		4.39	
Affective	1	1.78		.74		2.91		6.99		.72		2.91	
	2	.00		.00		3.07		2.25		.95		3.02	
	3	1.12		.00		2.89		2.08		1.11		7.62	
	All	1.40		.28		6.76		9.06		.82		8.97	

Note: W is calculated only where χ_r^2 is significant.

*$p \leq .05$

Table 4

Friedman's X_r^2 and Kendall's Coefficient of Concordance (w)

for Revised RCS Student Verbal Categories According to Contextual Purpose

for each Teacher Within and Across Periods

		Teacher A		Teacher C		Teacher E		Teacher F		Teacher H		Teacher K	
Contextual Purpose	Period	X_r^2	w	X_r^2	w	X_r^2	w	X_r^2	w	X_r^2	w	X_r^2	w
All	1	30.29**	.79	30.74**	.80	31.81**	.81	37.72**	.87	37.78**	.89	30.04**	.79
	2	37.03**	.88	30.98**	.80	34.16**	.84	39.57**	.91	38.80**	.90	27.10**	.75
	3	39.14**	.90	30.43**	.80	39.74**	.91	35.41**	.86	41.07**	.93	23.21**	.70
	All	96.44**	.82	86.17**	.77	84.90**	.77	110.04**	.85	115.15**	.89	73.55**	.72
Cognitive	1	28.78**	.77	16.87**	.59	31.79**	.81	32.46**	.82	29.32**	.78	27.73**	.76
	2	32.17**	.82	19.63**	.64	31.64**	.81	37.72**	.89	34.53**	.85	20.60**	.66
	3	31.46**	.81	21.64**	.67	33.91**	.84	28.48**	.77	39.51**	.91	16.72**	.59
	All	87.26**	.78	53.16**	.61	80.25**	.75	96.57**	.82	99.43**	.83	60.76**	.65
Procedural	1	32.49**	.82	30.51**	.80	23.83**	.71	34.78**	.85	38.04**	.89	21.93**	.68
	2	32.67**	.83	29.14**	.78	27.94**	.76	34.43**	.85	33.99**	.84	25.49**	.73
	3	32.81**	.83	24.18**	.71	25.83**	.73	32.77**	.83	37.79**	.89	17.79**	.61
	All	93.63**	.81	75.47**	.72	71.97**	.71	94.51**	.81	105.52**	.86	56.43**	.63
Behavorial	1	2.93		.70		7.44		6.61		3.70		6.83	
	2	2.90		3.60		12.03		9.28		14.27+	.55	3.91	
	3	4.78		6.40		8.89		4.83		12.90		8.72	
	All	9.23		8.60		24.80**	.42	17.89*	.35	25.80**	.42	16.76**	.34
Social	1	1.74		1.71		6.28		3.07		1.19		.70	
	2	.71		2.30		8.88		2.14		.70		0	
	3	3.08		4.70		7.70		.70		0		4.34	
	All	3.91		5.58		20.21**	.38	4.25		1.20		1.45	
Affective	1	.70		.40		1.80		8.50		.40		.71	
	2	0		0		2.14		.40		.40		1.91	
	3	.71		0		2.27		.70		.40		2.61	
	All	.94		.13		5.03		3.53		.60		3.36	

\+ $p < .10$
* $p < .05$
** $p < .01$

Table 5

Occurrence of Teacher and Student Categories of Verbal Behavior within a Social, Behavioral, and Affective Context for each Teacher

	Teacher											
	A		C		E		F		H		K	
	Categories		Categories		Categories		Categories		Categories		Categories	
	T	St	T	St	T	St	T	St	T	St	T	St
No. Observation Periods in which no Interactions in this Context were Observed												
Social	13	13	11	11	6	7	12	13	15	15	12	13
Behavioral	3	9	2	9	1	4	1	5	1	3	2	5
Affective	14	15	17	17	9	11	9	11	13	15	9	12
Highest adjusted tally during any period per category with this context												
Social	4.0	8.1	6.2	7.3	6.1	12.2	5.0	20.2	2.3	5.8	9.2	4.1
Behavioral	16.9	17.1	12.7	6.8	15.5	16.6	21.8	14.5	17.6	18.2	27.3	62.0
Affective	2.2	2.2	.8	.8	5.5	5.8	14.5	14.7	2.0	1.1	48.6	11.4

Table 6

Number of Observation Periods during which One or more Categories were used within Social, Behavioral, and Affective Contexts

Number of Categories used	Teacher A		Teacher C		Teacher E		Teacher F		Teacher H		Teacher K	
	Categories T	St	Categories T	St	Categories T	St	Categories T	St	Categories T	St	Categories T	St
Social Context												
1	2		3	5	1	2	2	2	1	1	4	3
2	1	4	2		2	6	2	2	1	2	1	1
3		1	2	2		3	3	1	2		1	
4	2				2							1
≥5												
Behavioral Context												
1	8	6	13	9	8	7	8	10	2	8	5	7
2	2	3	2		4	3	8	2	4	2	4	5
3	4		1		1	4	1		7	2	4	1
4	1				3			1	1	3		
≥5					1				3		3	
Affective Context												
1	2	3	1	1	5	4	4	5	3	3	3	3
2	2				3	3	2	1	1		2	3
3					1		3	1	1		1	
4							2				3	
≥5												

Table 7

Number of Observation Periods during which each Category within a Social Context was used (1) Once Only,[a] (2) Most frequently,[b] and (3) Second or lower frequency

Category	Teacher A			C			E			F			H			K		
	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less
1 S			2	3	2	1	1	4	5		2				2		1	
2 S		1							1		1				2			
3/4S	1	1	1		2	2		6	2	1	2	1		2				2
5 S	1		3		1			2	1		2							
6 S		2			1	1			6	1		2		1	1	4	1	
7 S																		
8 S																		
9 S																		
11 S	1	1							6			1				1		1
12 S												1						
13 S						2												1
14 S	2	1			1	1		1	3		2				2			1
15/16S	5			5	2		2	9		2	3		1	2		2	2	
17 S																		
18 S									1									1
19 S																		

Note a: Where a category was used only once, it was actually the most frequently used category. Hence, both the "once only" and the "most frequent" columns indicate high frequency categories.

Note b: Where $\geq$ 2 categories were used.

Table 8

Number of Observation Periods during which each Category within an Affective Context was used (1) Once Only,[a] (2) Most frequently,[b] and (3) Second or lower frequency

Category	Teacher A			C			E			F			H			K		
	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less
1 F	1	1					3	2		1	2	2			1	1	1	1
2 F												1						2
3/4F	1		2	1			2	2	2	2	3	1	2	1		1	3	2
5 F									1		1	1						1
6 F		1						2		1	3	2	1			1	3	6
7 F														1				
8 F																	1	2
9 F																		
11 F								2				1						
12 F												1						
13 F																	1	2
14 F									1	1			1			1		
15/16F	3			1			4	3		4	2		2			3	2	
17 F																		
18 F																		
19 F																		

Note a: Where a category was used only once, it was actually the most frequently used category. Hence, both the "once only" and the "most frequent" columns indicate high frequency categories.

Note b: Where $\geq$ 2 categories were used.

Table 9

Number of Observation Periods during which each Category within a Behavioral Context was used (1) Once only,[a] (2) Most frequently,[b] and (3) Second or lower frequency

Category	Teacher A			C			E			F			H			K		
	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less	Once	Most	Less
1 B			2					2	4			1	1		3		1	6
2 B			1						3						2			
3/4B		3	3		1	1			3	1	2	4		2	11			9
5 B	1		1									1			6			5
6 B		1	2						2		2			1	4		1	3
7 B	2	3		6	2	1	3	8	1	5	5	1		8	4	5	6	2
8 B			1					1	1						1			1
9 B	5	1		5	1	1	5		2	2		3	1	6	3	2	3	1
11 B			2					2	4									
12 B				1											2			
13 B									2			1	2		4		1	2
14 B	1								1	1	2	1		1	4			1
15/16B	4	3		8			5	7		8	3		6	6		6	5	1
17 B	1														1			
18 B															1			2
19 B			1				2			1		1			2	1		

Note a: Where a category was used only once, it was actually the most frequently used category. Hence, both the "once only" and the "most frequent" columns indicate high frequency categories.

Note b: Where $\geq$ 2 categories were used.

Table 10

Rank Order and Significant Differences of Teacher Verbal Categories Globally and for Cognitive and Procedural Contexts for each Teacher

Rank	Teacher A	Teacher C	Teacher E	Teacher F	Teacher H	Teacher K
	Global					
1	3/4	10	6	6	3/4	6
2	10	6	3/4	3/4	7	3/4
3	7	3/4	7	7	6	7
4	6	7	10	10	10	10
5	2	5	1	1	5	2
6	5	1	2	5	2	1
7	1	2	5	2	1	5
8	9	9	8	9	9	9
9	20	8	20	8	8	8
10	8	20	9	20	20	20
	Cognitive					
1	3/4	10	6	6	6	6
2	6	6	3/4	3/4	3/4	3/4
3	10	3/4	1	10	5	2
4	2	1	2	1	2	1
5	1	2	10	2	10	10
6	5	5	8	5	1	5
7	8	7	5	7	8	8
8	7	20 [tie]	20	8	7	7
9	20	8	7	9	9	20
10	9	9	9	20	20	9
	Procedural					
1	7	10	7	7	7	7
2	10	7	10	10	10	6
3	3/4	6	6	3/4	3/4	10
4	6	3/4	3/4	6	5	3/4
5	5	5	1	5	6	5
6	2	2	5	1	1	2
7	1	1	2	2	2	1
8	20	8	20	9	8	9
9	8	9	8	8	9	8
10	9	20	9	20	20	20

Note: A statistically significant difference between categories (calculated by means of Tukey's pairwise comparisons) is indicated by the two wide line segments. For example, for Teacher A on the Global categories, there is a significant difference between category 6 and category 5. Therefore, there is a significant difference between all categories which have a rank order above category 6 (rank 4) and those below category 5 (rank 6). There is no significant difference between the categories parallel to the narrow line, e.g. between 6 and 2, and between 5 and 2.

Table 11

Total Number of Adjusted Tallies for each RCS Category without regard to Context (Global) for each Teacher

	Teacher					
Category	A	C	E	F	H	K
1	99.8	126.8	352.0	205.5	174.8	188.4
2	191.7	122.1	210.5	117.1	188.5	225.7
3/4	650.7	382.8	460.3	565.4	681.5	519.5
5	158.8	145.8	111.8	134.6	277.1	135.0
6	429.6	731.2	607.7	800.3	682.4	942.7
7	456.7	451.7	422.7	689.4	583.8	496.4
8	29.7	17.7	85.6	6.4	76.8	21.3
9	46.3	22.9	32.7	28.1	102.0	74.5
10	910.1	1605.8	552.8	582.2	464.3	339.9
11	73.0	63.2	85.3	77.2	16.6	40.1
12	20.0	53.1	20.5	22.3	24.5	7.9
13	30.5	91.9	47.3	87.2	116.9	119.5
14	233.6	143.6	192.3	192.2	408.7	74.8
15/16	1294.5	700.6	1208.4	1411.5	1109.1	1406.1
17	17.0	2.4	3.8	6.9	14.5	38.9
18	12.8	9.8	15.6	10.6	10.3	18.3
19	3.8		8.6	8.4	1.7	2.8
20	165.9	249.8	186.9	5.8	15.9	1.9
21	124.9	28.7	344.3		1.1	295.7

Table 12

Total Number of Adjusted Tallies for each RCS Category within a Cognitive Context for Each Teacher

	Teachers					
Category	A	C	E	F	H	K
1 C	61.0	64.9	197.3	130.2	85.0	132.4
2 C	151.1	69.4	176.3	78.8	118.9	182.3
3/4C	428.2	156.3	320.8	349.1	393.2	321.7
5 C	50.5	43.6	40.0	43.1	129.8	62.4
6 C	297.1	267.9	376.0	541.0	454.5	511.6
7 C	23.1	17.7	8.8	18.2	23.9	26.6
8 C	21.4	4.6	74.4	2.9	48.8	13.5
9 C	6.6		4.0	2.3	8.9	
10 C	463.7	430.8	125.7	176.2	131.0	106.6
11 C	40.5	28.8	47.6	44.9	11.6	36.1
12 C	13.7	16.4	13.2	8.5	9.7	6.8
13 C	16.6	30.4	27.2	51.8	44.9	64.5
14 C	108.1	44.0	99.1	83.5	221.5	35.4
15/16 C	755.3	278.8	756.4	807.9	551.5	1016.2
17 C	2.0		1.1	2.4	3.6	9.2
18 C	8.2	3.8	8.3	8.5	5.8	12.2
19 C				3.0		
20 C	73.4	249.8	137.8		10.1	1.9
21 C	97.7	28.7	342.1		1.1	294.7
Total	2621.1	1735.2	2756.6	2352.1	2253.3	2864.4
Total exc. 10	2157.4	1304.4	2630.9	2175.9	2122.2	2757.8

Table 13

Total Number of Tallies for each RCS Category

within a Procedural Context

	Teachers					
Category	A	C	E	F	H	K
1 P	29.1	45.7	96.1	52.6	82.5	23.9
2 P	35.2	52.8	31.2	35.3	64.7	40.4
3/4 P	198.0	217.0	93.8	164.9	247.4	150.7
5 P	98.2	101.4	65.1	84.7	135.2	68.4
6 P	117.3	454.7	214.3	226.5	189.2	285.4
7 P	386.8	374.5	339.2	595.9	486.7	393.4
8 P	6.4	13.2	8.0	3.5	27.1	3.9
9 P	15.2	3.1	2.9	4.6	14.4	4.9
10 P	384.1	946.7	371.2	353.7	257.4	184.3
11 P	27.1	23.7	16.3	20.1	5.1	2.0
12 P	6.4	35.8	7.3	11.2	12.0	1.0
13 P	13.9	58.2	16.4	34.3	62.7	42.4
14 P	112.8	95.2	81.5	99.2	165.0	36.4
15/16 P	453.1	370.6	299.9	492.2	471.1	236.0
17 P	14.0	2.4	2.7	4.5	9.2	29.8
18 P	4.6	6.0	6.1	2.2	2.7	1.9
19 P	2.8		1.9	3.4		
20 P	92.0		31.0	5.8	5.7	
21 P	27.2		2.3			
Total	2024.7	2801.2	1677.0	2194.6	2238.7	1504.7
Total exc. 10	1640.6	1854.5	1305.8	1840.9	1981.3	1320.4

Table 14

Total Number of Adjusted Tallies for each RCS Category within a Social Context for each Teacher

	Teachers					
Category	A	C	E	F	H	K
1 S	2.2	16.5	26.9	6.9	2.3	4.1
2 S	4.0		1.2	1.2	2.3	
3/4S	5.4	6.0	26.3	0.7	4.4	2.1
5 S	7.9	.9	5.0	2.2		
6 S	5.6	8.4	8.7	5.7	3.4	18.9
7 S						
8 S						
9 S						
10 S	33.4	32.5	19.6		5.8	6.0
11 S	2.0	10.7	6.0	3.8		2.1
12 S				1.3		
13 S		3.2				2.1
14 S	11.4	4.3	9.8	3.1	4.6	1.0
15/16 S	22.8	20.7	58.6	31.3	13.2	11.1
17 S						
18 S			1.2			1.0
19 S						
20 S						
21 S						
Total	94.8	103.2	163.2	66.0	32.9	48.7
Total exc. 10	61.4	70.7	143.6	66.0	27.1	42.7

Table 15

Total Number of Adjusted Tallies for each RCS Category within an Affective Context for each Teacher

	Teachers					
Category	A	C	E	F	H	K
1 F	4.0		10.3	14.4	.8	7.9
2 F				1.8		2.0
3/4F	3.1	.8	7.0	28.9	4.0	17.0
5 F			1.0	2.0		1.0
6 F	2.2		5.9	17.9	3.4	70.2
7 F					.9	
8 F						3.0
9 F						
10 F	2.2	23.3	1.8	4.0	1.7	3.2
11 F			2.1	8.7		
12 F				1.3		
13 F						2.9
14 F			1.0	1.0	.9	.9
15/16 F	5.3	.8	18.8	28.7	2.1	29.2
17 F						
18 F						
19 F						
20 F						
21 F						
Total	16.7	24.9	47.8	108.9	13.9	137.4
Total exc. 10	14.5	1.6	46.0	104.0	12.2	134.2

Table 16

Total Number of Adjusted Tallies for each RCS Category within a Behavioral Context for Each Teacher

	Teachers					
Category	A	C	E	F	H	K
1 B	3.3		31.0	1.3	4.4	20.2
2 B	1.0		1.9		2.7	1.0
3/4B	15.3	3.1	12.5	11.4	33.8	28.0
5 B	2.1		1.0	2.3	11.9	3.1
6 B	7.4		2.9	9.2	31.8	26.6
7 B	46.5	59.4	74.6	75.1	72.2	76.5
8 B	2.1		3.4		.9	1.0
9 B	24.6	19.8	25.7	21.2	78.9	69.5
10 B	26.9	172.5	34.8	48.3	68.3	40.1
11 B	3.4		13.3			
12 B		1.0			2.6	
13 B			4.0	1.0	9.4	7.6
14 B	1.1		1.0	5.4	16.3	1.0
15/16 B	57.6	29.8	74.9	52.2	73.7	113.9
17 B	1.0				1.8	
18 B					1.8	3.1
19 B	1.0		6.7	2.0	1.7	2.8
20 B			18.0			
21 B						1.0
Total	192.8	285.6	305.4	228.6	410.9	395.2
Total exc. 10	165.9	113.1	269.6	180.3	342.6	355.1

Table 17

Mean Number of Adjusted Tallies for Category 15/16 Globally and within a Cognitive Context according to Activity for each Teacher

Activity	Teacher A	C	E	F	H	K
Global						
Without Regard to Activity	71.9	38.9	67.1	78.4	61.6	78.1
Cognitive Context						
Without Regard to Activity	42.0	15.5	42.0	44.9	30.6	56.5
During Reading	38.4	17.3	19.4	45.7	34.5	26.5
During Sharing	32.8		142.7	127.4		113.2